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1 [A survey of methods for recovering quadrics in triangle meshes](#)

Sylvain Petitjean

June 2002 **ACM Computing Surveys (CSUR)**, Volume 34 Issue 2Full text available: [pdf\(3.91 MB\)](#)
 Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In a variety of practical situations such as reverse engineering of boundary representation from depth maps of scanned objects, range data analysis, model-based recognition and algebraic surface design, there is a need to recover the shape of visible surfaces of a dense 3D point set. In particular, it is desirable to identify and fit simple surfaces of known type wherever these are in reasonable agreement with the data. We are interested in the class of quadric surfaces, that is, algebraic surfa ...

Keywords: Data fitting, geometry enhancement, local geometry estimation, mesh fairing, shape recovery

2 [Three-dimensional object recognition](#)

Paul J. Besl, Ramesh C. Jain

March 1985 **ACM Computing Surveys (CSUR)**, Volume 17 Issue 1Full text available: [pdf\(7.76 MB\)](#)
 Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

A general-purpose computer vision system must be capable of recognizing three-dimensional (3-D) objects. This paper proposes a precise definition of the 3-D object recognition problem, discusses basic concepts associated with this problem, and reviews the relevant literature. Because range images (or depth maps) are often used as sensor input instead of intensity images, techniques for obtaining, processing, and characterizing range data are also surveyed.

3 [Multiprocessor experiments for high-speed ray tracing](#)

Severin Gaudet, Richard Hobson, Pradeep Chilka, Thomas Calvert

July 1988 **ACM Transactions on Graphics (TOG)**, Volume 7 Issue 3Full text available: [pdf\(2.82 MB\)](#)
 Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)


New single- and multiprocessor models for ray tracing are presented. Important features are (1) the use of custom VLSI building blocks, (2) the use of a modified hierarchical data-

structure-based ray tracing algorithm with three disjoint data sets, and (3) scene access through adaptive information broadcasting. A modular design is presented that permits incremental performance enhancement up to two orders of magnitude over conventional minicomputers or workstations. Ray tracing is a surpris ...

4 Visualizing large-scale telecommunication networks and services (case study)

Eleftherios E. Koutsofios, Stephen C. North, Russell Truscott, Daniel A. Keim

October 1999 **Proceedings of the conference on Visualization '99: celebrating ten years**

Full text available:  [pdf\(1.43 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Visual exploration of massive data sets arising from telecommunication networks and services is a challenge. This paper describes SWIFT-3D, an integrated data visualization and exploration system created at AT&T Labs for large scale network analysis. SWIFT-3D integrates a collection of interactive tools that includes pixel-oriented 2D maps, interactive 3D maps, statistical displays, network topology diagrams and an interactive drill-down query interface. Example applications are described ...

5 Distance approximations for rasterizing implicit curves

Gabriel Taubin

January 1994 **ACM Transactions on Graphics (TOG)**, Volume 13 Issue 1

Full text available:  [pdf\(2.43 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

In this article we present new algorithms for rasterizing implicit curves, i.e., curves represented as level sets of functions of two variables. Considering the pixels as square regions of the plane, a "correct" algorithm should paint those pixels whose centers lie at less than half the desired line width from the curve. A straightforward implementation, scanning the display array evaluating the Euclidean distance from the center of each pixel to the curve, is impractical, and a ...

Keywords: algebraic curve, approximate distance, implicit curve, rendering

6 Combining supervised learning with color correlograms for content-based image retrieval

Jing Huang, S. Ravi Kumar, Mandar Mitra

November 1997 **Proceedings of the fifth ACM international conference on Multimedia**

Full text available:  [pdf\(1.42 MB\)](#)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

7 Terrain database interoperability issues in training with distributed interactive simulation

Guy A. Schiavone, S. Sureshchandran, Kenneth C. Hardis

July 1997 **ACM Transactions on Modeling and Computer Simulation (TOMACS)**, Volume 7 Issue 3

Full text available:  [pdf\(443.34 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

In Distributed Interactive Simulation (DIS), each participating node is responsible for maintaining its own model of the synthetic environment. Problems may arise if significant inconsistencies are allowed to exist between these separate world views, resulting in unrealistic simulation results or negative training, and a corresponding degradation of interoperability in a DIS simulation exercise. In the DIS community, this is known as the simulator terrain database (TDB) correlation problem. ...

Keywords: distributed interactive simulation, terrain databases

8 The weighted region problem: finding shortest paths through a weighted planar subdivision



Joseph S. B. Mitchell, Christos H. Papadimitriou

January 1991 **Journal of the ACM (JACM)**, Volume 38 Issue 1

Full text available:  pdf(3.92 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

The problem of determining shortest paths through a weighted planar polygonal subdivision with n vertices is considered. Distances are measured according to a weighted Euclidean metric: The length of a path is defined to be the weighted sum of (Euclidean) lengths of the subpaths within each region. An algorithm that constructs a (restricted) "shortest path map" with respect to a given source point is presented. The output is a partitioning of each edge of the su ...

Keywords: Dijkstra's algorithm, Voronoi diagrams, shortest paths, terrain navigation, weighted distance functions

9 Spatial query processing in an object-oriented database system



Jack A. Orenstein

June 1986 **ACM SIGMOD Record , Proceedings of the 1986 ACM SIGMOD international conference on Management of data**, Volume 15 Issue 2

Full text available:  pdf(1.04 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

DBMSs must offer spatial query processing capabilities to meet the needs of applications such as cartography, geographic information processing and CAD. Many data structures and algorithms that process grid representations of spatial data have appeared in the literature. We unify much of this work by identifying common principles and distilling them into a small set of constructs. (Published data structures and algorithms can be derived as special cases.) We show how these constructs can be ...

10 Large meshes and GPU programming: Brook for GPUs: stream computing on graphics hardware



Ian Buck, Tim Foley, Daniel Horn, Jeremy Sugerman, Kayvon Fatahalian, Mike Houston, Pat Hanrahan

August 2004 **ACM Transactions on Graphics (TOG)**, Volume 23 Issue 3

Full text available:  pdf(266.63 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In this paper, we present Brook for GPUs, a system for general-purpose computation on programmable graphics hardware. Brook extends C to include simple data-parallel constructs, enabling the use of the GPU as a streaming co-processor. We present a compiler and runtime system that abstracts and virtualizes many aspects of graphics hardware. In addition, we present an analysis of the effectiveness of the GPU as a compute engine compared to the CPU, to determine when the GPU can outperform the CPU ...


Keywords: Data Parallel Computing, GPU Computing, Brook, Programmable Graphics Hardware, Stream Computing

11 Efficient execution of multiple query workloads in data analysis applications



Henrique Andrade, Tahsin Kurc, Alan Sussman, Joel Saltz

November 2001 **Proceedings of the 2001 ACM/IEEE conference on Supercomputing (CDROM)**

Full text available:  [pdf\(193.03 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Applications that analyze, mine, and visualize large datasets are considered an important class of applications in many areas of science, engineering, and business. Queries commonly executed in data analysis applications often involve user-defined processing of data and application-specific data structures. If data analysis is employed in a collaborative environment, the data server should execute multiple such queries simultaneously to minimize the response time to clients. In this paper we pre ...

12 An integrated color-spatial approach to content-based image retrieval

Wynne Hsu, S. T. Chua, H. H. Pung

January 1995 **Proceedings of the third ACM international conference on Multimedia**

Full text available:  [htm\(38.02 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: color retrieval, content-based retrieval, image segmentation, spatial retrieval

13 Emancipated pixels: real-world graphics in the luminous room

John Underkoffler, Brygg Ullmer, Hiroshi Ishii

July 1999 **Proceedings of the 26th annual conference on Computer graphics and interactive techniques**

Full text available:  [pdf\(613.18 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

Keywords: CAD, architectural space, computer vision, luminous-tangible interfaces, projection, real-world graphics

14 Non-photorealistic rendering: A stained glass image filter

David Mould

June 2003 **Proceedings of the 14th Eurographics workshop on Rendering**

Full text available:  [pdf\(3.68 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

Medieval stained glass windows are a stylized artform that has not previously been thoroughly treated in the computer graphics literature. In this paper, we present an automated method for transforming an arbitrary image into a stained-glass version of that image. The key issues in designing a stained glass window are the tile boundaries and tile colors. We use erosion and dilation operators to manipulate and smooth an initial region segmentation tiling; we choose tile colors from the palette of ...

15 Session 4: Finding planar regions in a terrain: in practice and with a guarantree

Stefan Funke, Theodoris Malamatos, Rahul Ray

June 2004 **Proceedings of the twentieth annual symposium on Computational geometry**

Full text available:  [pdf\(1.18 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We consider the problem of computing large connected regions in a triangulated terrain of size n for which the normals of the triangles deviate by at most some small fixed angle. In previous work an exact near-quadratic algorithm was presented, but only a heuristic implementation with no guarantee was practicable. We present a new approximation algorithm for the problem which runs in $O(n\epsilon^2)$ time and---apart from giving a guarantee on

the quality of the produ ...

Keywords: approximation, planarity, terrain

16 Binary space partitions for axis-parallel segments, rectangles, and hyperrectangles

Adrian Dumitrescu, Joseph S. G. Mitchell, Micha Sharir

June 2001 **Proceedings of the seventeenth annual symposium on Computational geometry**

Full text available:  [pdf\(251.16 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We provide a variety of new results, including upper and lower bounds, as well as simpler proof techniques for the efficient construction of binary space partitions (BSP's) of axis-parallel segments, rectangles, and hyperrectangles. (a) A consequence of the analysis in \cite{dAF} is that any set of n axis-parallel and pairwise-disjoint line segments in the plane admits a binary space partition of size at most $2n-1$. We establish a worst-case lower bound of $2n-o(n)$ for the size of such ...

17 Systems & applications I: A software-based eye tracking system for the study of air-traffic displays

Jeffrey B. Mulligan

March 2002 **Proceedings of the symposium on Eye tracking research & applications**

Full text available:  [pdf\(850.58 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

This paper describes a software-based system for offline tracking of eye and head movements using stored video images, designed for use in the study of air-traffic displays. These displays are typically dense with information; to address the research questions, we wish to be able to localize gaze within a single word within a line of text (a few minutes of arc), while at the same time allowing some freedom of movement to the subject. Accurate gaze tracking in the presence of head movements requi ...

Keywords: Head and eye tracking, air traffic displays, image registration, scan-path analysis

18 High-speed visual estimation using preattentive processing

Christopher G. Healey, Kellogg S. Booth, James T. Enns

June 1996 **ACM Transactions on Computer-Human Interaction (TOCHI)**, Volume 3 Issue 2

Full text available:  [pdf\(1.20 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

A new method is presented for performing rapid and accurate numerical estimation. The method is derived from an area of human cognitive psychology called preattentive processing. Preattentive processing refers to an initial organization of the visual field based on cognitive operations believed to be rapid, automatic, and spatially parallel. Examples of visual features that can be detected in this way include hue, intensity, orientation, size, and motion. We believe that studies from preatt ...


Keywords: Munsell, boundary detection, cognitive psychology, color, estimation, human vision, icon, multidimensional data, orientation, preattentive, scientific visualization, target detection

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Very high resolution simulation of compressible turbulence on the IBM-SP system

A. A. Mirin, R. H. Cohen, B. C. Curtis, W. P. Dannevik, A. M. Dimits, M. A. Duchaineau, D. E.


Eliason, D. R. Schikore, S. E. Anderson, D. H. Porter, P. R. Woodward, L. J. Shieh, S. W. White
January 1999 **Proceedings of the 1999 ACM/IEEE conference on Supercomputing
(CDROM)**

Full text available:  pdf(8.31 MB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

20 [Rendering vector data over global, multi-resolution 3D terrain](#)

Zachary Wartell, Eunjung Kang, Tony Wasilewski, William Ribarsky, Nickolas Faust
May 2003 **Proceedings of the symposium on Data visualisation 2003**

Full text available:  pdf(2.51 MB)

Additional Information: [full citation](#), [abstract](#), [index terms](#)

Modern desktop PCs are capable of taking 2D Geographic Information System (GIS) applications into the realm of interactive 3D virtual worlds. In prior work we developed and presented graphics algorithms and data management methods for interactive viewing of a 3D global terrain system for desktop and virtual reality systems. In this paper we present a key data structure and associated render-time algorithm for the combined display of multi-resolution 3D terrain and traditional GIS polyline vector ...

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